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ABSTRACT

This review analyzes current research trends in the application of planning models to broad educational systems. Planning models reviewed include systems approach models, simulation models, operational gaming, linear programing, Markov chain analysis, dynamic programing, and queuing techniques. A 77-item bibliography of recent literature is included. (RA)

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Models for Planning

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MODELS FOR PLANNING

Analysis of Literature and Selected Bibliography

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FOREWORD

In mid-June 1970 the Clearinghouse received an urgent request from Central ERIC in the U.S. Office of Education to prepare selected bibliographies and brief analyses of literature on eleven critical topics related to school organization and administration.

The bibliographies and analyses were required by USOE's National Center for Educational Research and Development (formerly the Bureau of Research) in planning its new program of directed research and development. School organization and administration is one of four areas of education chosen by the center to receive concentrated research and development assistance. The others are reading, early childhood, and vocational education.

Through a joint effort the Clearinghouse staff completed the bibliographies and analyses for shipment to USOE by July 2, the deadline date.

The analysis and bibliography combined here focus on (1) the kinds of planning techniques, strategies, etc., that now exist in education or are under development, (2) the evidence of effectiveness of such planning systems, and (3) promising planning models and strategies in other fields not yet applied to education.

The literature cited in the bibliography and analyzed in the paper was drawn from a search of the two ERIC index catalogs, Research in Education and Current Index to Journals in Education, and from the following non-ERIC sources: Books in Print, Cumulative Book Index, Education Index, Public Affairs Information Service, Sociological Abstracts, Social Sciences and Humanities Index, and Book Review Digest. Although the urgency of the request precluded a full and comprehensive search and analysis of the literature, the reviews and bibliographies are intended to assess accurately some of the current developments and emerging trends on the topic.

Many of the documents cited in the bibliography can be ordered from the ERIC Document Reproduction Service. Instructions for ordering these documents are given at the end of the bibliography.

Philip K. Piele
Director

Analysis of Literature on

MODELS FOR PLANNING

A variety of planning models--including linear programming, dynamic programming, Markov chain analysis, computer simulation models, operational gaming, program evaluation review technique, critical path method, and queuing techniques--have been analyzed in the literature and applied to broad educational systems.

Linear Programming

Problems of assignment and distribution are two of the most important applications of linear programming models. Educational planners can use the technique to assign personnel or equipment to various activities. Shapley and others (1966) used an assignment model in a problem of bus routing and assignment of students. Clarke and Surkis (1968) devised a linear programming model to achieve a desired ethnic composition of students at each school, set a maximum travel time for any given student, and mimimize total daily student travel time. Similar assignment models are provided by Lefkowitz and D'Epsopo (1967) and O'Brien (1967a).

Bush and Mosteller (1955), Cogswell and others (1965), and Oakford and others (1967) have developed sophisticated linear programming models capable of generating master schedules of classes and assigning students. Models to determine optimum strategies for allocating state resources, to determine

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Note: This paper was adapted largely from "Systems Approaches to Educational Planning," by Marvin C. Alkin and James E. Bruno, part 4 of Social and Technological Change: Implications for Education, a monograph containing five papers commissioned by the Clearinghouse.

logical and consistent salary schedules at minimum district cost, and to consider various patterns of subsidies for college students are provided by Bruno (1968) and Hoenock (1969). A study by Bowles (1967) concerned the problem of allocating resources to education within the context of a whole economy. Both costs and benefits of various educational programs were explicitly considered.

Stone (1966) created a model that depicted the flow of students through an educational system by means of an input-output matrix. Each level of education was considered as the input for the next level.

Dynamic Programming

Linear programming and input-output analysis are used in static models. Dynamic programming is a more useful mathematical technique for solving problems with many interrelated stages, often measured in time intervals. It takes into account the effect that changes in previous stages have on present and future stages. Presently, applications of dynamic programming are mostly potential. Among the problems potentially solvable by this method are the timing of equipment replacement and the smoothing of production levels to meet variable demands (Lindsay 1963). In education, decisions concerning the location and size of future schools and the repair and replacement of school equipment might be amenable to this analysis.

Markov Chain Analysis

A Markov chain is a procedure used to describe and predict the behavior or state of a system at some future time based on the system's present status

and on some transition probability figures or probable flow rates. The DYNAMOD model developed by the U.S. Office of Education is a Markovian, demographic-flow model used to predict increases in students and teachers for the nation as a whole in the next decade (Zabrowski and others 1967). Merck (1965) has a similar model for projecting movements of personnel through a system, and Durstine (1969) has a model dealing with numbers of students in each level of an educational system.

Computer Simulation Models

Many computer-simulation models have been used to explain expenditures for education at the macroscopic level (Alkin 1966, Hirsch and Marcus 1966, James and others 1963, and Miner 1963). At the individual school level, the greatest advances have been at the university level. Wilson (1969) provided a conceptual framework for the consideration of computer-simulation techniques in higher education planning. The University of California has employed such models for its planning purposes (Keller 1967). Two other models that describe the workings of a university are Judy (1968) and Koenig and Keeney (1969).

In elementary and secondary education, Sisson (1969) has a model for determining the required number of teachers and other employees for each year of a planning period. Another model, intended to relate resource allocation to achievement, was described by Sisson in 1967 as under development.

Other models have been developed for projecting school enrollment (Griffin and Schmitt 1967), locating sites (O'Brien 1967a and Uxer 1967),

and recruiting and using substitute teachers (Haussman and Rath 1965 and Bruno 1969a).

Operational Gaming

One variation of simulations is operational gaming. Goodman (1969) is developing a game dealing with a problem of school integration and geared primarily to the school board member as a participant. By allowing participants to play roles as representatives of various community interest groups, the game enables them to better understand the political implications of potential decisions. Adelson and others (1967) used inputs provided by several rounds of expert judgment as the basis for an educational-planning game. Although geared to the national level, the technique might be appropriate at the school district level as well.

PERT and CPM

Two of the least mathematical of all the systems techniques for educational planning are program evaluation review technique (PERT) and the critical path method (CPM). Although CPM and PERT are alike because both are essentially network types of analysis, CPM originally differed from PERT by including cost factors as well as time and by employing some mathematical procedures for finding lowest cost. Now, however, aspects of cost are also being related to and used in PERT.

The leading advocate of the application of PERT to education is Desmond Cook. A monograph prepared by Cook (1966b) describes the technique and its pertinent applications to education. Gold (1968) reported on its use in

scheduling the construction of at least three other junior colleges. Kapfer (1968) has developed an institutional strategy based on PERT to assist teachers in establishing a sequence of activities leading to greater individualization of instruction.

Queuing Techniques

Many segments of education seem appropriate for analysis by queuing techniques. Queuing theory is concerned with the waiting-line problem. Queues or waiting lines often form where people or things require some specialized service whose facilities are limited. The time factor is always involved. Application of queuing theory requires information concerning the rate of arrivals at the servicing stations, the time required to perform the service, and the method of selecting whom to be served. In general, the problems take one of two forms: Either the facilities to meet certain specified needs must be determined, or the facilities are fixed and the problem is one of scheduling the arriving units. The ultimate goal in such problems is to achieve an economic balance between the cost of service and the cost of waiting.

School business applications might include the scheduling of secretarial or telephone answering time. Perhaps it could be applied to the scheduling of books or student registration. Gold (1968) employed the technique to determine how many counselors should be made available by a city college. Although such applications appear pedestrian, they point out clearly that relatively simple applications offer the greatest benefits at this time.

Selected Bibliography on

MODELS FOR PLANNING

Adelson, M.; Alkin, M. C.; Carey, C.; and Helmer, O. "Planning Education for the Future: Comments on a Pilot Study." American Behavioral Scientist, 7 (1967), entire issue.

Alkin, M. C. Financing Junior Colleges in California: A Critical Analysis of the State Support Program. Sacramento, California: State Department of Education, 1966.

Bowles, S. S. "The Efficient Allocation of Resources in Education." Quarterly Journal of Economics, 2 (1967).

Bruno, J. E. "A Monte Carlo Analysis for Determining Optimal Size of Substitute Teacher Pools." Mimeographed. Los Angeles: University of California, Graduate School of Education, 1969.

Bruno, J. E. "The Use of Mathematical Programming Models to Optimize Various Objectives of Foundation-Type State Support Programs." Unpublished Ph.D. dissertation, University of California, Graduate School of Education, 1968.

Bruno, J. E. "Uses of Monte Carlo Techniques in Long-Range School District Planning." Paper presented at the annual conference of the American Educational Research Association, Los Angeles, February 1969.

Bush, R. R., and Mosteller, F. Stochastic Models for Learning. New York: John Wiley and Sons, Inc., 1955.

Churchman, C. W.; Ackoff, R. L.; and Arnoff, E. L. Introduction to Operations Research. New York: John Wiley and Sons, Inc., 1957.

Clarke, S., and Surkis, J. "An Operations Research Approach to Racial Desegregation of School Systems." Socio- Economic Planning Sciences, 1 (1968), 259-272.

Cochran, Leslie H. "PERT: A Technique in Educational Research." Journal of Educational Research, 63, 1 (September 1969), 19-25.

Cogswell, J., and others. A Computer Simulation Vehicle for Educational Systems. Santa Monica, California: System Development Corporation, March 22, 1965. ED 010 579: $1.75 paper, $0.25 microfiche.

Cogswell, J., and others. Analysis of Instructional Systems. Report of a Project, New Solutions to Implementing Instructional Media through Analysis and Simulation of School Organization. Final Report. Santa Monica: System Development Corporation, 1966. ED 010 577: $13.70 paper, $1.25 microfiche.

Cogswell, J., and others. Construction and Use of the School Simulation Vehicle. Santa Monica, California: System Development Corporation, September 1, 1964. ED 010 581: $1.15 paper, $0.25 microfiche.

Cook, D. L. "Applications of PERT to Education." Paper prepared for Operation PEP: A statewide project to prepare educational planners for California, February, 1968.

Cook, D. L. "Better Project Planning and Control through the Use of System Analysis and Management Techniques." Paper presented at the Symposium on Operations Analysis of Education, sponsored by the National Center for Educational Statistics, Washington, D. C., November 20-22, 1967. ED 019 729: $0.95 paper, $0.25 microfiche.

Cook, D. L. "PERT Applications in Educational Planning." Paper presented at the annual meeting of the Association of Educational Data Systems, Philadelphia, Pennsylvania, May 3, 1966. ED 019 751: $0.75 paper, $0.25 microfiche.

Cook, D. L. Program Evaluation and Review Technique: Applications in Education. Washington, D. C.: U. S. Office of Education, Cooperative Research Monograph No. 17, 1966. ED 015 533: paper not available from EDRS, $0.50 microfiche. Paper copy available from GPO (OE-12024, $0.45).

Cook, D. L. "The Use of Systems Analysis and Management Techniques in Program Planning and Evaluation." Paper presented at the Symposium on the Application of Systems Analysis and Management Techniques to Educational Planning in California, Chapman College, Orange, California, June 12-13, 1967. ED 019 752: $0.65 paper, $0.25 microfiche.

Correa, Hector. "Models and Mathematics in Educational Planning." Chapter 24 in The World Yearbook of Education, 1967; Educational Planning, edited by George Z. F. Bereday and others. London: Evans Brothers. Ltd., 1967.

Corrigan, R. E., and Johnson, D. W. The Requirements and Process for Planned Educational Change. California: Tulare County Department of Education, Operation PEP, 1966.

Durstine, R. M. "In Quest of Useful Models for Educational Systems." Socio-Economic Planning Sciences, 2 (1969), 417-437.

Educational Service Bureau, Inc. Systems Planning in Public Education. Arlington, Virgina: Administrative Leadership Service, 1968. ED 026 743: not available from EDRS. Available from Administrative Leadership Service, Division of Educational Service Bureau, Inc., 1507 M Street, N. W., Washington, D. C. 20005, for $4.00.

Eidell, Terry L., and Nagle, John M. Conceptualization of PPBS and Data-Based Educational Planning. Technical Report No. 6. Eugene, Oregon: Center for the Advanced Study of Educational Administration, April 1970.

Gold, B. K. "Quantitative Methods for Administrative Decision Making in Junior Colleges." Unpublished Ed. D. dissertation, University of California, Graduate School of Education, 1968.

Goodman, R. F. "SDC School System: Crisis Simulation," Santa Monica, California: System Development Corporation, September 1969.

Griffin, M., and Schmitt, J. "A Monte Carlo Model for the Prediction of School Enrollments." Paper presented at the annual conference of the American Educational Research Association, Chicago, February 1967.

Haggart, S. A. "Evaluating Alternatives in Educational Planning." Santa Monica, California: The RAND Corporation, D-17238-SMS, June 1968.

Haggart. S. A. "Program Budgeting and Educational Planning: An Overview for Operation PEP." Santa Monica, California: The RAND Corporation, D-17230-SMS, June 1968.

Haggart, S. A., and Carpenter, M. B. "Program Budgeting as an Analytical Tool for School District Planning." Santa Monica, California: The RAND Corporation, P-4031, February 1969.

Hartley, H. J. "Economic Rationality in Urban School Planning--The Program Budget." Urban Education, 3, 1 (1967), 39-51.

Hartley, H. J. Educational Planning-Programming-Budgeting: A Systems Approach. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968.

Haussman, R. D., and Rath G. J. "Automated Teacher Assignment--A GPSS Simulation." Journal of Educational Data Processing, 3 (1965), 103-108.

Hirsch, W. Z., and Marcus, M. J. "Some Benefit-Cost Considerations of Universal Junior College Education." National Tax Journal, 1 (1966), 48-57.

Hoenock, S. A. "Efficient Allocation of Subsidies to College Students." Socio-Economic Planning Sciences, 2 (1969), 503-512.

Hoffenberg. M. "Program Budgeting in Education: Some Organizational Implications." In Strategies of Educational Planning: Proceedings of the Second Annual Conference on the Economics of Education, edited by R. H. P. Kraft. Tallahassee, Florida: Educational Systems Development Center, Florida State University, 1969.

James, H. T.; Thomas, J. A.; and Dyck, H. "Wealth, Expenditure and Decision-Making for Education." Cooperative Research Project No. 1241. Stanford, California: Stanford University, School of Education, 1963.

Jamison, C., and McLeod-Guertin, J. "Two System Models for Educational Planning." Educational Technology, (June 1969), 29-31.

Judy. R. W. Systems Analysis for Efficient Resource Allocation in Higher Education. Toronto, Canada: University of Toronto, Institute for the Quantitative Analysis of Social and Economic Policy, November, 1968.

Judy, R. W., and others. "Systems Analysis of Alternative Designs of a Faculty." Paper presented at the Meeting on Budgeting, Programme Analysis and Cost-Effectiveness in Educational Planning, Paris, April 3-5, 1968.

Jung, Charles, and others. Appendix N. Implementation of the RUPS System in a Total School District. Portland: Northwest Regional Educational Laboratory, October 1968. ED 026 319: $2.20 paper, $0.25 microfiche.

Kapfer, P. G. " An Instructional Management Strategy for Individualized Learning." Phi Delta Kappan, 5 (1968), 260-263.

Kaufman, R. A.; Clinkenbeard, W.; and Wood, R. A Generic Educational Planning Model. Los Angeles: The Los Angeles County Supplementary Education Center, May 1969.

Keller, J. W. "The Use of Models in University Decision Making." Report issued by the office of the president. Berkeley: University of California, November 1967.

Knezevich, S. J. "Probing the Planning and Programming Dimensions of PPBS." Washington, D. C.: American Association of School Administrators, National Academy for School Executives, 1969.

Knezevich, S. J. "The Systems Approach to School Administration: Some Perceptions on the State of the Art in 1967." Paper presented at the U. S. Office of Education Symposium on Operations Analysis of Education, November 19-22, 1967. ED 025 853: $0.80 paper, $0.25 microfiche.

Koenig, H. E., and Keeney, M. G. "A Prototype Planning and Resource Allocation Program for Higher Education." Socio-Economic Planning Sciences, 2 (1969), 201-215.

Kraft, Richard H. P., ed. Strategies of Educational Planning, Proceedings of the Annual Conference on the Economics of Education (2nd, Tallahassee, Florida, July 1968). Tallahassee: Educational Systems Development Center, Florida State University, 1969. ED 027 615: $15.55 paper, $1.25 microfiche.

Lave, R. E., and Kyle, D. W. "The Application of Systems Analysis to Educational Planning." Comparative Education Review, 1 (1968), 39-56.

Lavin, Richard J. "New Technique Improves School Facilities Planning." Audiovisual Instruction, 14, 8 (October 1969), 58-59.

Lefkowitz, B., and D'Epsopo, D. A. "Analysis of Alternative Methods for Improving Racial Balance in a School District." Paper presented at the 31st meeting of the Operations Research Society of America, New York, May 1967.

Lindsay, F. A. New Techniques for Management Decision Making. New York: McGraw-Hill, Inc., 1963.

Mansergh, Gerald G., ed. Systems Approaches to the Management of Public Education. Detroit: Metropolitan Detroit Bureau of School Studies, Inc., April 1969. ED 031 788: $2.75 paper, $0.25 microfiche.

McGivney, Joseph H., and Nelson, William C. Program, Planning, Budgeting Systems for Education. Volume III: An Annotated Bibliography. Final Report. Bibliography Series No. 3. Columbus: Center for Vocational and Technical Education, Ohio State University, 1969. ED 035 756: $2.95 paper, $0.25 microfiche.

McIsaac, Donald N., Jr., and others. A Time-Cost Management System for Use in Educational Planning. Madison: Department of Educational Administration, University of Wisconsin, January 1969. ED 025 935: not available from EDRS. Available from University of Wisconsin, Department of Educational Administration, Information Systems, 415 W. Gilman Station, Madison, Wisconsin 53706.

Meals, D. "Heuristic Models for Systems Planning." Phi Delta Kappan, (January 1967), 199-203.

Meckley, Richard F., and others. A Guide to Systematic Planning for Vocational and Technical Schools. Research 22. Columbus: Center for Vocational and Technical Education, Ohio State University, December 1968. ED 026 537: $1.75 paper, $0.25 microfiche.

Merck, J. W. "A Markovian Model for Projecting Movements of Personnel through a System." Lackland Air Force Base, Texas: Air Force Systems Command, Personnel Research Laboratory, Aerospace Medical Division, PRL-TR-65-6, 1965.

Miner, J. Social and Economic Factors in Spending for Public Education, Syracuse, New York: Syracuse University Press, 1963.

National Education Association. "Planning for Educational Development in a Planning, Programming, Budgeting System." Report prepared for the Committee on Educational Finance, National Education Association. Washington, D. C.: George Washington University, State-Local Finance Project, 1968.

Oakford. R. V.; Allen, D. W.; and Chatterton, L. A. "School Scheduling Practice and Theory." Journal of Educational Data Processing, 1 (1966-67), 16-50.

O'Brien, R. J. "Model for Planning the Location and Size of Urban Schools." Paper presented at the U. S. Office of Education Symposium on Operations Analysis of Education. Washington, D. C.: November 1967.

O'Brien, R. J. A School Submodel for Large Urban Schools. Washington, D. C.: National Center for Educational Statistics, June 21, 1967. ED 013 500: $0.90 paper, $0.25 microfiche.

O'Brien, R. J., and Lyle, J. R. Outline of an Urban Educational Model. Washington, D. C.: National Center for Educational Statistics, 1968. ED 018 860: $0.95 paper, $0.25 microfiche.

Operation PEP. Symposium on the Application of System Analysis and Management Techniques to Educational Planning in California (Chapman College, Orange, California, June 12-13, 1967). Burlingame, California: Operation PEP, 1967. ED 023 181: $16.05 paper, $1.25 microfiche.

Rath, G.J. "PPBS is More than a Budget: It's a Total Planning Process." Nation's Schools, 82 (November 1968).

Savard, William G. A Dynamic General Planning Model for the Hawaii Department of Education. Honolulu: Hawaii State Department of Education, 1967. ED 020 560: $1.20 paper, $0.25 microfiche.

Shapley, L.; Fulkerson, D.; Horelick, A.; and Weiler, D. "A Transportation Program for Filling Idle Classrooms in Los Angeles." Santa Monica, California: The RAND Corporation, P-3405, July 1966.

Sisson, Roger L. "Can We Model the Educational Process?" Socio-Economic Planning Sciences, 2 (1969), 109-119.

Sisson, Roger L. Some Results of a Simulation of an Urban School District. Philadelphia: Management Science Center, Pennsylvania University, 1967. ED 012 096: $3.50 paper, $0.50 microfiche.

Stone, R. "Input-Output and Demographic Accounting: A Tool for Educational Planning." Minerva, 3 (1966), 365.

Thonstad, T. Mathematical Models in Educational Planning. A mathematical model of the Norwegian educational system. Paris: Organization for Economic Cooperation and Development, 1967.

Tracz, George S. "An Overview of Optimal Control Theory Applied to Educational Planning." Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, California, February 5-8, 1969. ED 030 189: $0.60 paper, $0.25 microfiche.

Vincent, Howard L. Selected Bibliography--Application of Economic Analysis and Operations Research to Problems in Educational Planning. Washington, D.C.: Division of Operations Analysis, Office of Education, 1966. ED 014 129: $0.55 paper, $0.25 microfiche.

Uxer, J.E. "An Operations Research Model for Locating Area Vocational Schools." Las Cruces: School of Education, New Mexico State University, 1967.

Wilson, Charles Z. "The Use of Computer Simulation Techniques in Educational Planning." Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, February 1969. ED 029 382: $1.10 paper, $0.25 microfiche.

Wurtele, Zivia S. Mathematical Models for Educational Planning. Professional Paper. Santa Monica, California: System Development Corporation, 1967.

Zabrowski, Edward K., and others. Student-Teacher Population Growth Model: DYNAMOD II. Washington, D. C.: National Center for Educational Statistics, 1967. ED 015 556: $4.30 paper, $0.50 microfiche.

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